Project Report: Walmart Sales Forecasting

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1. INTRODUCTION

1.1 Project Overview

This project focuses on elevating Walmart's sales forecasting using advanced machine learning algorithms. The primary objective is to provide a more accurate prediction of sales, particularly during key holidays, enhancing strategic decision-making.

1.2 Purpose

By leveraging historical sales data, integrating machine learning algorithms such as ARIMA, Random Forest, and XgBoost, and implementing a responsive Flask web interface, the project aims to empower Walmart in making data-driven decisions for optimized sales strategies during promotional markdown events.

2. LITERATURE SURVEY

2.1 Existing Problem

Challenges in sales forecasting are pervasive, but this project uniquely addresses Walmart's need for precise predictions during promotional markdown events and holidays, providing a valuable contribution to the retail sector.

2.2 References

Informed by studies on sales forecasting, machine learning applications in retail, and insights from prior projects, the project draws on a foundation of relevant literature to inform its methodologies and approaches.

2.3 Problem Statement Definition

The project focuses on evaluating the impact of holidays—such as Christmas, Thanksgiving, Super Bowl, and Labor Day—on Walmart store sales. The analysis is conducted using historical data to discern patterns and trends during these critical periods.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

The empathy map serves as a crucial tool in understanding the perspectives and needs of Walmart and its stakeholders, guiding the ideation process to create a solution tailored to their specific requirements.

3.2 Ideation & Brainstorming

Brainstorming sessions led to the selection of algorithms, including ARIMA for time series analysis and Random Forest and XgBoost for ensemble learning. The decision to integrate Flask emerged to provide a user-friendly interface for effective interaction with the forecasting system.

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement

The core functional requirement is the development of a robust system capable of accurately predicting Walmart sales during holidays. This involves data preprocessing, algorithm training, and a responsive web interface using Flask.

4.2 Non-Functional Requirements

Non-functional requirements emphasize the system's scalability to handle large datasets and its responsiveness to ensure a seamless user experience through the Flask web interface.

5. PROJECT DESIGN

5.1 Data Flow Diagrams & User Stories

Detailed data flow diagrams outline the movement of data from preprocessing to model training and presentation. User stories ensure alignment with end-users' expectations throughout the development process.

5.2 Solution Architecture

The project's architecture encompasses data preprocessing, algorithm training, Flask integration, and a user-friendly front-end, ensuring a cohesive and efficient process for sales forecasting.

6. PROJECT PLANNING & SCHEDULING

6.1 Technical Architecture

Technical architecture details the systematic flow of data from preprocessing to the final presentation, incorporating Flask for a dynamic web interface.

6.2 Sprint Planning & Estimation

Sprint planning involved breaking down tasks into manageable units, prioritizing features, and estimating the time required for each development phase to maintain a structured and efficient workflow.

6.3 Sprint Delivery Schedule

The project adhered to a sprint schedule, ensuring timely delivery of key functionalities and maintaining a continuous development cycle.

7. CODING & SOLUTIONING

7.1 Feature 1

Data preprocessing, including handling missing values and encoding categorical variables, was implemented to prepare the dataset for effective model training.

7.2 Feature 2

The second feature involved training machine learning models, specifically Random Forest, XgBoost, and ARIMA, to accurately forecast Walmart sales during holidays.
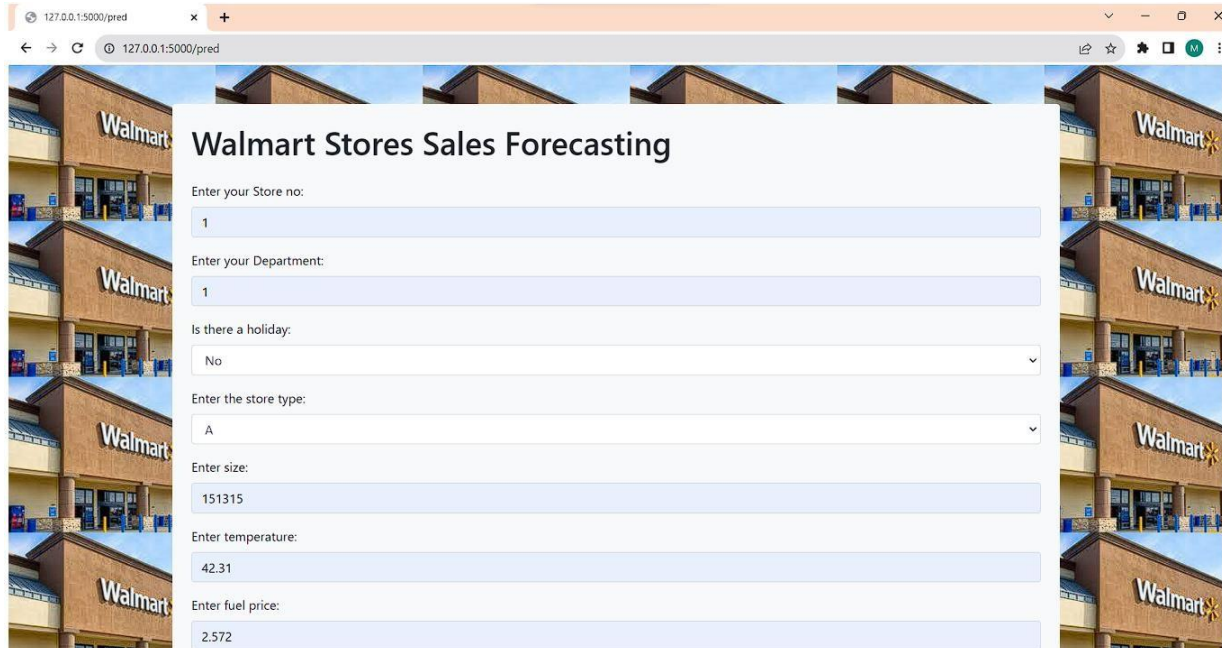
8. PERFORMANCE TESTING

8.1 Performance Metrics

Performance metrics, including mean squared error and mean absolute error, were employed to rigorously evaluate the accuracy and efficiency of the developed forecasting models.

9. RESULTS

9.1 Output Screenshots

Screenshots from the Flask-integrated web interface showcase accurate sales forecasts, highlighting the impact of holidays on Walmart store sales in a visually intuitive manner.

The predicted profit is The predicted profit is 20210.587600000003

10. ADVANTAGES & DISADVANTAGES

The project's advantages include improved sales predictions, while challenges include the sensitivity of models to fluctuations in promotional events and the need for ongoing optimization.

11. CONCLUSION

In conclusion, the project successfully enhances Walmart's sales forecasting accuracy, offering valuable insights for strategic decision-making during critical sales periods.

12. FUTURE SCOPE

Future enhancements may involve refining algorithms, incorporating additional features, and expanding the system's capabilities for broader retail applications beyond Walmart.

13. APPENDIX

Additional information, code snippets, and supporting documents are included in the project's appendix for further reference and detailed insights.

Source Code

https://github.com/smartinternz02/SI-GuidedProject-607041-1698684605/blob/main/walmart-sales-forecast%20(2).ipynb

GitHub

https://github.com/smartinternz02/SI-GuidedProject-607041-1698684605/tree/main

Project Demo Link

https://drive.google.com/file/d/1iRG5t58SDSEs9xVnDaFgkHwVW-BfaNhA/view?usp=drive_link